

HANDBOOK OF PHONOLOGICAL DATA  
FROM A SAMPLE OF THE WORLD'S LANGUAGES

A Report of the Stanford Phonology Archive

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400 Georgian	400 Georgian	400 Georgian
400 01 p-aspirated [b-aspirated-half-voice] 60	14 t/s-hacek 07 08 [d/z-hacek] 61	25 n <sup>19</sup> [n-voiceless] 73 [n-half-voice] 74 [eng] 75 [n-uvular] 75 [n-palatoalveolar] 75
400 02 p [b] 61	15 t/s-hacek-aspirated 07 08 [d/z-hacek-aspirated-half-voice] 60	26 l-velarized <sup>20</sup> [l-voiceless-velarized] 73 76 [l-half-voice-velarized] 74 [l] 77
400 03 p-ejective 02 03 [b-creaky voice] 62	16 t/s-hacek-ejective 02 03 07 08 [d/z-hacek-creaky voice] 62	27 r-trill 21 22 [r-trill-voiceless] 73 76 78 [r-trill-half-voice] 74 (free) [r-flap] 79 (free)
400 04 t-aspirated <sup>04</sup> [d-aspirated-half-voice] 60	17 s <sup>10</sup> [z-half-voice] 65	28 h <sup>30</sup> (limited, loan)
400 05 t <sup>04</sup> [d] 61	18 z <sup>10</sup> [s-lax] 66 (free)	51 iota [iota-backed] 80
400 06 t-ejective 02 03 04 [d-creaky voice] 62	19 s-hacek <sup>10 11 12</sup>	52 e-mid [e] 81 [e-mid-backed] 80
400 07 k-aspirated [g-aspirated-half-voice] 60 [c-aspirated] 63 [j-aspirated-half-voice] 60 63	20 z-hacek <sup>10 12</sup> [s-hacek-lax] 66 (free)	53 schwa-over-short <sup>82</sup> (transitional)
400 08 k [g] 61 [c] 63 [j] 61 63	21 x-uvular <sup>13 14</sup>	54 a-front [alpha-unrounded] 24 83
400 09 k-ejective 02 03 [g-creaky voice] 62 [c-ejective] 63 [j-creaky voice] 62 63	22 gamma-uvular <sup>13 14 15</sup> [x-uvular-lax] 67 (free) [gamma-uvular-half-voice] 68 (free)	55 upsilon <sup>25</sup> [upsilon-fronted] 84
400 10 q-ejective 02 03 05 [q-creaky voice] 62 [gamma-uvular-creaky voice] 60 64 (free)	23 beta <sup>16 17</sup> [w] 69 (free) [v] 70 (free) [phi] 71 (free) [w-voiceless] 71 (free) [i-trema-over-short] 18 72 (free)	56 o-mid <sup>25</sup>
400 11 t/s <sup>07 08 09</sup> [d/z] 61	24 m [m-voiceless] 73 [m-half-voice] 74	57 yod <sup>85</sup> (transitional)
400 12 t/s-aspirated <sup>07 08</sup> [d/z-aspirated-half-voice] 60		
400 13 t/s-ejective 02 03 07 08 [d/z-creaky voice] 62		
400 \$a Georgian \$d Caucasian \$e SW USSR \$f 2,700,000 \$g Jim Lorentz \$g Marilyn Vihman (review)		
400 \$a Robins, R.H., and Natalie Waterson \$b 1952 \$c Note on the Phonetics of the Georgian Word \$d BSOAS 15:1.55-72 \$q one informant \$r 15 sessions		
400 \$a Selmer, Ernst W. \$b 1935 \$c Georgische Experimentalstudien \$f (Avhandlingar Utgitt Av Det Norske Videnskaps-Akademi i Oslo II. Hist.-Filos Klasse 1935 No.1) \$g Oslo: I Kommissjon Hos Jacob Dybwad \$q one informant \$r one session		
400 \$a Tschenkeli, Kita \$b 1958 \$c Einfuehrung in die georgische Sprache. Volume I. \$g Zuerich: Amirani Verlag \$q author is native speaker		
400 \$a Vogt, Hans \$b 1938 \$c Esquisse d'une grammaire du georgien moderne \$d NTS 9.5-114 \$q informants \$q texts \$r Vogt is a well known Georgian scholar		
400 \$a Vogt, Hans \$b 1939 \$c Alternances vocaliques en georgien \$d NTS 11.118-135 \$r Vogt is a well known Georgian scholar		
400 \$a Vogt, Hans \$b 1958 \$c Structure phonemique du georgien \$d NTS 18.5-90 \$r Vogt is a well known Georgian scholar		

- 400 \$a Vogt, Hans \$b 1971 \$c Grammaire de la langue georgienne \$g Oslo: Instituttet for Sammlignende Kulturforskning Universitets Forlaget \$q informants \$q texts \$r Vogt is a well known Georgian scholar
- 400 \$a **ASPIRATED STOPS** \$A Tschenkeli (p.LI) says that aspiration is strong. Robins & Waterson (p.66) say that aspiration "...varied in degree with the stress patterning of the word. Aspirated consonants preceding the vowel of a stressed syllable were more strongly aspirated than aspirated consonants in unstressed syllables or in final position in the word. Particularly strong aspiration was heard in aspirated consonants in stressed syllables when also in initial position." In an afterword to Selmer's study, Vogt remarks that [p-aspirated] is (impressionistically) generally more strongly aspirated than [t-aspirated] and [k-aspirated]. Vogt quotes Achwlediani as making the same assertion. (Selmer, p.51)
- 400 \$a **CREAKY VOICE VOWELS** \$A In syllables whose vowel is immediately preceded by a glottalized consonant the glottalization is realized over the syllable as a whole.... After glottalized consonants in these cases there is a noticeable constriction in the vowel. Single intervocalic glottalized consonants are frequently articulated with some voice, in which case the glottalization is more easily "heard in the vowel" than in the consonant itself. It is, in fact, a glottalized syllable that is heard. (p.66)
- 400 \$a **INTONATION** \$A Vogt (1939, p.119) notes that intonation has a distinctive, grammatical function in interrogative sentences. In such sentences, the question is usually marked only by a rising-falling melodic curve at the end of the sentence. This intonational curve covers the last two syllables or even just the final syllable (in which case the vowel of that syllable is considerably lengthened). Vogt emphasizes that in such a case there is a separation of the stress accent and the musical accent. Tschenkeli (p.LX) remarks that if an interrogative sentence begins without an interrogative pronoun or adverb, then the accent falls on the last word (i.e. the last syllable of the sentence) and the vowel of that syllable carries a strong questioning tone, and is greatly lengthened, even doubled. According to Robins & Waterson (p.58), "final syllables are stressed when the word is uttered as a repeated question; this syllable is then said on a rising pitch."
- 400 \$a **LONG VOWELS (NON-DISTINCTIVE)** \$A There is no phonemic length distinction for Georgian vowels but phonetically, "...they are rather short, but may be lengthened when emphasized." (Vogt, p.8) "...there is a tendency for stressed vowels to be slightly longer than unstressed vowels." (Robins & Waterson, p.59)
- 400 \$a **MORPHEME STRUCTURE** \$A initial C...C: Vogt (1958) analyzes clusters in stems (not really roots, but words with certain inflectional prefixes and suffixes subtracted). Up to six C occur stem-initially. A general formula, writing "O" for obstruent, "S" for sonorant, "r" for /r-trill/, is (O)(r)(O)(S)(S) where either the first or second O (but not both) may be a cluster of two obstruents. (p.65) \$A final C...C: Vogt (1958, p.77) analyzes stem final clusters by the formula (S)(O)(O)(S)(S). (Here O stands for a single obstruent.)
- 400 \$a **NASALIZED VOWELS** \$A "Some nasalization frequently occurs in the vowel contiguous with preceding /m/...[or] /n/." Also before final /n/ and /n/ + C vowels may be nasalized, with /n/ "reduced or zero," especially before /s, z, s-hacek, z-hacek/. (p.62)
- 400 \$a **PHONOLOGICAL WORD** \$A initial C: any C \$A initial C...C: /beta, m, k, k.beta/ as inflections can precede stems, giving in principle up to eight word initial C (Vogt 1958, p.15) \$A final C: any C \$A final C...C: /t-aspirated, s/ as inflections can follow stems, giving in principle up to six word final C (Vogt 1958, p.70)
- 400 \$a **STRESS** \$A Stress is non-distinctive and apparently falls on the antepenultimate syllable (or first syllable in disyllabics). Every source agrees that, in general, the tonal contour of Georgian in word and phrase is not very marked. According to Vogt 1971, in two and three syllable words the stress and the highest pitch fall on the first syllable. In words of more than three syllables, the intensity of stress increases and the pitch rises, in general, up to the antepenultimate syllable, after which both stress and pitch fall to their lowest level on the last syllable. While one syllable is always emphasized in terms of intensity and tone, the contrast is nevertheless fairly weak, the pronunciation of Georgian being rather monotone with no great differences of intensity or musical pitch. (p.15f) Vogt (1938, p.16-18) describes Georgian stress as relatively free, depending on the sentence rhythms. (Cf. also Vogt 1939.) To take a four-syllable example, a light stress will typically fall on the first syllable, a light secondary stress on the penultimate--but an alternate pronunciation with antepenultimate stress is equally possible. Vogt states explicitly that stress here is neither fixed on one syllable, as in German, nor mobile, with morphological significance, as in Russian. Vogt 1939 stipulates that the last syllable of a polysyllabic word may never be stressed, which fact may serve as a "negative (word-) boundary marker," in Trubetskoy's terms. (p.119) The "tempo of speaking" (Sprechtempo) is very regular. All syllables (except the accented syllable) have the same length. Especially, no syllable is shortened or lengthened at the expense of another syllable. (Tschenkeli, p.LIX)
- 400 \$a **SYLLABLE** \$A (C...)(V(C...)) \$A Every source agrees that there are as many syllables in a word as there are vowels. "Phonologically there are no diphthongs, all vowels, irrespective of whether they are immediately preceded or followed by another vowel being able to carry stress,

and therefore constituting individual syllables. Phonetically, however, the vowel sequences /a-front.upsilon/ ([alpha-unrounded.upsilon]), /o-mid.upsilon/, when stressed on the first vowel, were heard as falling diphthongs.... Conversely, /iota.upsilon/ and /upsilon.iota/, when stressed on the second vowel, were heard as rising diphthongs." (Robins & Waterson, p.60) There is no indication that the sonorants ever constitute a syllable nucleus. In fact, although /beta/ may be reduced to the short, high, back vowel [i-trema-over-short] between consonants, Robins & Waterson (p.63) add that: "this could never constitute a syllable nucleus." Thus Georgian has initial and final consonant clusters of considerable length, the sonorants in these clusters always being non-syllabic. §A syllable division: "We found it convenient to take medial consonants in native words with the following vowel (CV/CCVC etc.) except that /m, n, l-velarized, s, z, s-hacek, z-hacek, x-uvular, gamma-uvular, r-trill/ (i.e. all continuants which can occur in the following environments-JL) in contexts V\_C-...were taken with the preceding vowel." (Robins & Waterson, p.58) Tschenkeli (p.LXI) follows this rule also, assigning initial continuants of a medial consonant cluster to the preceding syllable.

400 §A TENSE STOPS §A Vogt (1938, p.11) says that the "voiced stops" are characterized by both voicing and lack of tenseness (i.e. "qualite de douce"). Robins & Waterson (p.65) contrast the fortis glottalized stops and affricates with both the aspirated and non-aspirated stops and affricates which are both characterized as lenis. Vogt emphasizes that the lenis quality of the "voiced" stops contrasts with aspiration and glottalization in the other stop series, even when voicing is not present. Here the unaspirated non-glottalized stops and affricates are marked as lax and the glottalized stops and affricates as tense. The aspirated stops are not marked with respect to this feature.

400 §A VOICED STOPS §A Robins & Waterson (p.66) say: "The unaspirated plosives and affricates are frequently referred to as "voiced," but voice is not a constant feature of the members of this series. In normal utterance of isolated words these consonants were heard as wholly or partly without voice in initial and final position, and before voiceless fricatives and aspirated or glottalized consonants, especially in a final cluster. Intervocally, or in medial clusters when directly preceding a vowel or voiced consonant, the unaspirated series were fully voiced." "For the purposes of emphasis or contrast however, initial and final unaspirated plosives and affricates may always be pronounced with full voicing; such finals are always followed by a distinct voiced off-glide."

400 §A VOICELESS SONORANTS §A Various degrees of voicelessness are possible in nasals. Robins & Waterson (p.62) remark that "m" and "n" are "wholly voiceless" initially before any voiceless consonant. Vogt (1958, p.9) says that "m" and "n" are "often" voiceless before voiceless consonants. Tschenkeli (p.LV) says that "m" is "almost voiceless" before voiceless consonants, "especially in initial position." Surprisingly, Selmer's experimental phonetic data (p.17, 18, 20, 21) show a fully or partially voiceless [m] even before vowels in word initial position. "...after aspirated consonants [l-velarized, r-trill, m, n] were partly unvoiced and the aspirated release was in part realized in the [l-velarized, r-trill, m, n] following." (Robins & Waterson, p.67) "After glottalized consonants [l-velarized, r-trill, m, n] were fully voiced and heard as distinctly 'separated' from the preceding consonant." (Robins & Waterson, p.67).

400 02 §A "Marked ejective articulation--that is, initiation of the air-stream by an upward movement of the closed glottis against closure at some point in the mouth--is confined to glottalized consonants that are in initial position or members of initial clusters in the word." (p.65)

400 03 §A "The articulation of these [ejective] consonants is characterized by a greater muscular tension than for the voiced and voiceless [consonants]." (Vogt 1971, p.12)

400 04 §A "The dental occlusives are articulated with the point of the tongue touching the upper teeth." (Vogt 1971, p.9)

400 05 §A Tschenkeli (p.LVI) says that the first (or oral) explosion of [q-ejective] is often not heard or is only heard as a muffled (dull) sound, due to the small amount of air contained between the uvular and glottal closure. Vogt (1938, p.11) also says that the explosion of [q-ejective] is often imperceptible to the ear.

400 06 §A [gamma-uvular-creaky voice] is not ejective, according to Robins & Waterson. (p.66n)

400 07 §A The alveolar stop closure in the affricates helps distinguish them (alongside their shorter duration) from clusters of dental stop plus alveolar fricative. (p.68)

400 08 §A "The total duration of the [affricate] does not exceed [the duration] of a simple occlusive." (Vogt 1971, p.9) Selmer (p.40) remarks that the subject of his experimental studies had no idea that these affricates were composed of two sound elements, nor was the subject able to pronounce the first component of an affricate in isolation.

400 09 §A Tschenkeli (p.LII) emphasizes that the Georgian /t/s/ affricate is one sound, such that it is not possible to distinguish by ear the two elements [t] and [s] which make up this affricate.

400 10 §A According to Robins & Waterson, /z/ and /z-hacek/ are distinguished from /s/ and /s-hacek/ in initial position (where /z/ and /z-hacek/ may be voiceless) mainly by a "less tense articulation" (p.63) of /z/ and /z-hacek/. Robins and Waterson call /s, z/ "blade-alveolar;"

- (p.63) Vogt (1938) and Tschenkeli find that they are not noticeably different from French and German /s, z/.
- 400 11 \$A /s-hacek/ is "partly or wholly unvoiced." (p.64)
- 400 12 \$A /s-hacek/ and /z-hacek/ have "no lip rounding or lip protrusion." (p.64) Vogt says they are "...accompanied by a weak rounding of the lips." (Vogt 1971, p.9)
- 400 13 \$A Robins & Waterson say /x-uvular/ and /gamma-uvular/ are velar and also cite "a more forward variety...heard before /iota/." (p.64)
- 400 14 \$A Tschenkeli (p.LV) remarks that /x-uvular/ and /gamma-uvular/ are sometimes voiced, depending on the environment (which is, however, not specified).
- 400 15 \$A /gamma-uvular/ is described as being "without scrape" (p.64), but cf. Tschenkeli (p.LIV): "the air passes through the narrowed passage between the soft palate and the back of the tongue, creating a clear friction, which is accompanied by vibration of the vocal bands."
- 400 16 \$A "In the speech of our informant the quality of [beta] was subject to much variation as between utterances of the same word, and in the language it seems more dependent than other sounds on differences in speed and style." (p.63) "The dialectal individual variations are very great, so that it is at present almost impossible to draw a clear line between the two pronunciations [labiodental and bilabial velarized]." (Vogt 1938, p.14) [trans. MVJ] Robins and Waterson note that /beta/ was "mostly pronounced bilabially by our informant." (p.63)
- 400 17 \$A /beta/ is "best regarded as a continuant in which the friction can be reduced in certain contexts to zero." (p.63)
- 400 18 \$A "Between two consonants the friction was often zero, especially between voiced consonants, /beta/ being realized as a short, close, unrounded, central-back vowel sound.... This could never constitute a syllable nucleus and cannot, therefore, be counted as a vowel in the Georgian system." (p.63)
- 400 19 \$A Robins & Waterson call /n/ "dental." Tschenkeli has "alveolar" for the tag phone.
- 400 20 \$A /l-velarized/ is "supradental" according to Vogt (1938, p.13) and Tschenkeli (p.LIV).
- 400 21 \$A Vogt (p.12) says that the number of vibrations ("battements"), "...does not exceed more than two or three after consonants before vowels." Robins & Waterson describe "r" as basically fricative in all environments, "similar to standard English initial 'r'" (p.63), but since they had only one informant and since no other source mentions a fricative articulation of "r," we depart from their analysis here. [MVJ] According to Vogt (1938, p.13) the "energetic [tongue] tapping" continues even in voiceless production of /r-trill/.
- 400 22 \$A /r-trill/ is normally nonsyllabic, however, Vogt (1938, p.13) says that /r-trill/ is often syllabic during singing.
- 400 23 \$A /schwa/ is described as a "neutral vowel sound of short duration." (p.67) Specific features are not given.
- 400 24 \$A [alpha-unrounded] is "a retracted variety [of /a-front/], mid-back." (p.59)
- 400 25 \$A The rounded vowels are "weakly labialized." (Vogt 1971(?), p.8)
- 400 30 \$A /h/ "is rare and perhaps confined to exclamations and loan words in present-day Georgian." (p.64f)
- 400 60 \$A Aspirated consonants are partly voiced in medial position after vowels, liquids, or nasals.
- 400 61 \$A Unaspirated unglottalized stops and affricates are voiced intervocalically or in clusters when directly preceding a vowel or voiced consonant. They are also voiced in initial clusters before or after liquids and nasals.
- 400 62 \$A The glottalized obstruents are realized with creaky voice in medial and final positions.
- 400 63 \$A Velar obstruents are fronted before /iota/. (Robins & Waterson, p.61)
- 400 64 \$A /q-ejective/ is realized as a glottalized uvular fricative before stops and affricates and intervocalically.
- 400 65 \$A /s/ is half-voiced in final position after vowels, and before voiced consonants.
- 400 66 \$A /z/ and /z-hacek/ may be partly or wholly unvoiced in initial position.
- 400 67 \$A /gamma-uvular/ may be devoiced before voiceless consonants and initially before nasals.

- 400 68    \$A /gamma-uvular/ may be partly unvoiced word finally.
- 400 69    \$A /beta/ may be realized as [w] in word initial position before vowels.
- 400 70    \$A /beta/ may be realized as [v] in word-final position.
- 400 71    \$A /beta/ is frequently realized as [phi] or [w-voiceless] before and after voiceless consonants.
- 400 72    \$A /beta/ is often realized as [i-trema-over-short] between two voiced consonants.
- 400 73    \$A Liquids and nasals are voiceless before voiceless consonants in initial position. ("In such cases [the realization of [m-voiceless]] is very slight, and it is sometimes omitted altogether" (p.62); [n-voiceless] very rarely occurs in this position. (p.62))
- 400 74    \$A Liquids and nasals are partly unvoiced after aspirated consonants and voiceless fricatives in medial position.
- 400 75    \$A /n/ is realized as a homorganic nasal before an obstruent.
- 400 76    \$A Liquids are devoiced between voiceless consonants. (Vogt 1938, p.13f; for /l-velarized/ only, Tschenkeli, p.LV)
- 400 77    \$A /l-velarized/ is realized as [l] before front vowels. (p.63, and Tschenkeli, p.LIV)
- 400 78    \$A /r-trill/ may be devoiced in word-final position after a voiceless consonant.
- 400 79    \$A /r-trill/ may be realized as [r-flap] in final position. (The number of vibrations "may be reduced to one." (Vogt 1971, p.12))
- 400 80    \$A Front vowels are retracted before final [l-velarized] or an [l-velarized.C] cluster.
- 400 81    \$A /e-mid/ is raised to [e] before /iota/ and /a-front/.
- 400 82    \$A [schwa-over-short] may be inserted between non-glottalized unaspirated stops and affricates.
- 400 83    \$A /a-front/ is realized as [alpha-unrounded] after /q-ejective, l-velarized/ and before /upsilon/ or syllable-final /l-velarized/.
- 400 84    \$A /upsilon/ is fronted after /iota/.
- 400 85    \$A [yod] may be inserted initially before non-low front vowels.